

THE WHITE HOUSE

WASHINGTON

December 15, 1987

MEMORANDUM FOR THE WORKING GROUP ON SPACE COMMERCIALIZATION

FROM: EUGENE J. McALLISTER *EM*

SUBJECT: Draft EPC Paper

The draft paper for the EPC is attached for your review and comments. Please call in any comments as soon as possible. *Thanks,*

I have scheduled a 2:00 p.m. meeting today to clarify some issues, such as insurance, as well as to review the options for the final time. If you are able to attend the meeting please notify my office, providing your birth date for clearance.

We are working on one-page issues papers on the more contentious issues, such as a Federal commitment to ISF and the INTELSAT issue. Hopefully these papers will be available at the 2:00 p.m. meeting.

I am also looking for inserts on Space Station contracting and COCOM restrictions on launches.

December 15, 1987

COMMERCIAL SPACE INITIATIVE

A quarter of a century ago, U.S. technological leadership in landing a man on the moon and returning him safely to Earth pushed back the frontier of space, providing opportunities for new scientific discoveries and a myriad of commercial activities in Earth's orbits and potentially on the lunar surface as well.

The Administration remains committed to pushing back farther the frontier of space through continued exploration of the solar system. The technology development necessary for future missions will contribute importantly, as it has done in the past, to the U.S. commercial sector's competitiveness in space activities. However, vigorous commercialization of space -- as well as U.S. leadership in space overall -- ultimately will depend upon the United States' ability to assure reliable, low cost, and continual access to space and reduce the cost of space systems and infrastructure. These aims can be accomplished through traditional belief and reliance on the vitality and productivity of the U.S. private sector. In effect, the free enterprise system must be expanded to space.

The Working Group on Space Commercialization has developed an initiative for the Council's consideration. This initiative has three components:

- o Building a Solid Talent and Technology Base
- o Assuring a Highway to Space
- o Promoting a Strong Commercial Presence in Space

I. BUILDING A SOLID TALENT AND TECHNOLOGY BASE

U.S. civil and commercial space leadership and competitiveness are highly dependent upon a sophisticated, evolutionary aerospace and space technology enterprise. This foundation will enable further [manned and unmanned] exploration of the solar system and scientific discoveries and make routine commercial use of space practical.

In addition, while the national pool of talent drawn to these endeavors will inevitably depend upon market opportunities in the coming years, it is important that young people and their teachers have opportunities to become familiar with aerospace and

space-related careers and the link between excellence in these disciplines and basic math, science, and computer skills. In this regard, it is interesting to note that the scientists, engineers, and technicians necessary to operate the Space Station are in elementary school today.

Proposal 1: The Administration will fund the Pathfinder technology development program beginning in FY 1989. (OMB currently has a proposal under review in the budget process).

Project Pathfinder is a research and technology program that will enable a broad range of manned and/or unmanned missions beyond Earth's orbits. The Administration began funding in FY 1988 a predecessor to Pathfinder: the Civil Space Technology Initiative (CSTI). This initiative is intended to foster development of technologies critical to U.S. missions in the Earth's orbits.

*proposed
initiation in
the FY88
budget*

In announcing Pathfinder, the Administration will stipulate a number of commercialization policies to apply to both the Pathfinder and CSTI programs:

- consistent with Administration policies and related statutes, federally funded contractors, universities and Federal labs will own the rights to any patents and technical data including copyrights resulting from this program;
- proposed technologies and patents available for licensing will be housed in a designated Pathfinder library; and
- in contracting for commercial development of prototypes, NASA will specify the desired outcome, i.e. performance, rather than design, permitting contractors to develop the latter.

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Project Pathfinder will be organized around four major focuses:

A. Exploration Technology,
including U.S. capability to develop:

- (a) planetary rover;
- (b) sample acquisition, analysis and preservation;
- (c) surface power; and
- (d) optical communications.

These technologies would be important to gathering data for robotic and manned missions to the moon, Mars, or other planets.

Question inclusion of this in commercial space policy

B. Operations Technology,
including U.S. capacity to develop:

- (a) autonomous rendezvous and docking;
- (b) resources processing pilot plant;
- (c) in-space assembly and construction;
- (d) cryogenic fluid depot; and
- (e) space nuclear power.

These technologies would augment existing U.S. capabilities, while reducing the cost of space infrastructure and operations for Earth orbit missions or the robotic and manned exploration of the Solar System.

C. Humans-in-Space Technology,
including:

- (a) extra-vehicular activity (suit);
- (b) human performance; and
- (c) closed-loop life support.

These technologies would provide essential engineering systems to enable effective performance and good health during long-duration missions.

D. Transfer Vehicle Technology,
including:

- (a) chemical transfer propulsion;
- (b) cargo vehicle propulsion;
- (c) high-energy aerobraking;
- (d) autonomous lander systems; and
- (e) fault-tolerant systems.

These technologies would provide critical logistics capability, while reducing the cost and risk for advanced transportation systems essential for a range of missions including Earth-orbiting science and the robotic and manned exploration of the Solar System.

RESEARCH

Proposal 2:

The Administration will announce the establishment of a new Federal-industry-university entity under contract with the NASA Office of Commercial Space Programs to encourage a broader range of microgravity research opportunities for Federal, university, and commercial researchers. Federal agencies represented in the consortium will include NASA, NSF, NIH, and other interested agencies. The consortium will also potentially include commercial and university microgravity research and launch vehicle and facility concerns.

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The ~~Center~~ will have among its activities the following:

- a. Encouraging and facilitating Government leases of commercial vehicles and facilities, e.g. Spacehab and ISF, with microgravity environments;
- b. Developing a central mechanism to facilitate Federal, university, and commercial researchers' access to commercial R&D services, including payload design consulting and launch services;
- c. Facilitating commercial and university access to limited research opportunities in the shuttle and Space Station through peer review recommendations on Federal selections from among applicants with research requests;
- d. Coordinating a Federal commercial/launch voucher program, enabling Federal agencies to fund microgravity research requiring a space launch.

EDUCATION

Proposal 3: NASA will expand its two week workshop program for high school science and math teachers to include secondary and elementary teachers. This will provide competitive opportunities for teachers to visit NASA field centers and selected aerospace industrial and university facilities.

The number of teachers annually participating in this program would increase from 200 to 1,000 at an annual cost of \$1.25 million.

Proposal 4: NASA will double the fellowship program for graduate and undergraduate students pursuing space science and engineering authorized in the FY 1988 budget National Space Grant College Act from the current 300 to 600 by 1990. NASA will also develop a set of actions to help address problems facing universities such as outdated equipment, severe faculty shortages, and insufficient graduate school enrollment by U.S. citizens.

Doubling the number of fellowships would increase the cost of the program from \$5.2 million per year to \$10.8 million.

Proposal 5: NASA, NSF, and DoD will contribute materials

and classroom experiments for coordination and distribution by the Department of Education to requesting schools for use in school development of "tech shop" programs and courses. NASA's Office of Commercial Space Programs will encourage corporate cost sharing of this program.

Proposal 6: As part of the Administration's Education Initiative, Federal agencies will encourage employees, including scientists, engineers, and technicians in aerospace and space related fields to take a sabbatical year to teach in any level of education in the United States under the Program.

II. ASSURING A HIGHWAY TO SPACE

The interruption in the Shuttle system has ^{certain} created an opportunity for a private commercial launch industry to develop. The private sector was given a big boost in September 1986 when the President directed NASA to remove commercial and foreign payloads from the Shuttle manifest. ^{August}

The commercial expendable launch vehicle industry now includes seven companies. The Department of Transportation estimates that the U.S. commercial launch sector has committed itself to non-recurring investments of more than \$400 million in facilities and equipment and more than \$1 billion in recurring expenditures to support commercial space transportation.

Long term competitiveness of the U.S. commercial launch industry will largely depend upon the U.S. sector's ability to reduce the costs associated with space launches and the nature of foreign launch competition, e.g. Europeans, Soviet Union, China, and Japan, much of which is currently subsidized. The President has directed USTR to begin international negotiations to ensure a level international playing field in commercial launch services.

The Working Group has identified several additional steps the Administration might take to ensure the development of the private U.S. commercial launch industry:

Proposal 7: All U.S. Government agencies will ^{Governmental space sectors shall} procure ^{fullest} necessary ELV launch services directly from the private sector to the ^{maximum} extent feasible.

Proposal 8: The Administration will consult with the commercial sector on the construction of commercial launch facilities separate from facilities owned by the DoD and NASA, and ^{used by} the commercial sector. (This proposal suggests the Federal Government ^{will} provide some subsidy to constructing commercial launch facilities.)

Proposal 10:

The Administration will ~~also~~ take administrative actions and offer statutory proposals to address the insurance concerns of the commercial launch industry.

- a. Third-party Liability. Consistent with Administration's tort policy, we will propose eliminating awards to third parties for punitive and pain and suffering damages resulting from commercial launch accidents. ~~NASA will similarly revise its indemnification policy for commercial payloads flown on the Shuttle; and~~
- b. Government Property Damage Liability. The liability of commercial launch operators for damage to Government property arising from a launch accident shall be limited to the level of insurance required by DoT pursuant to the Commercial Space Launch Act. Above this level, the Government will waive its right to recover for damage to Government property. Below this level, the Government shall waive its right to recover for damage to Government property where such damage is caused by the willful misconduct of Government employees or Government contractors.

(NASA will not indemnify for commercial)

Proposal 9:

and DoT will explore the provision of
requesting NASA will provide a one time launch voucher that can be used to purchase private launch services to owners of secondary R&D payloads awaiting a Shuttle launch.

Proposal 10:

with a current agreement for a Shuttle launch
The Administration will also take administrative actions and offer statutory proposals to address the insurance problems of the commercial launch industry.

- Replaced*
- Consistent with the Administration's tort policy, we will propose eliminating awards to third parties for punitive and pain and suffering damages resulting from commercial launch mishaps. NASA will similarly revise its indemnification policy for commercial payloads flown on the shuttle.
 - The Federal Government will assume liability for any damages caused by a commercial launch mishap to the extent that the damages are caused by Air Force negligence; or
 - The Government will assume liability for any damages caused by a commercial launch mishap to the extent that the damages are caused by Air Force negligence up to the level that commercial launch firms are required to insure. Above this amount, the Federal Government would waive its right to sue for damages.

III. PROMOTING A STRONG COMMERCIAL PRESENCE IN SPACE

has Federal investment in space technology and ventures has provided over the years the foundation for several commercial space industries, including communication and remote sensing satellites, launch services, and materials processing. Although Government continues to be the primary source of funding for technology advances, increasing foreign competition and the costs of development and operation of space vehicles and facilities suggests that the key to U.S. leadership and competitiveness in space lays ultimately with the vitality and productivity of the private sector. This means shifting from Federal "commercialization" of space through primarily technology spin-offs to Federal encouragement of commercial development and management of space systems and infrastructure.

In addition to policies regarding space commercialization enumerated in the proposed National security Decision Directive on National Space Policy, the Working Group on Space Commercialization has identified the following proposals:

Proposal 11: The Administration will announce a Federal commitment to the Industrial Space Facility (ISF) developed by the commercial sector. The Federal commitment will include the following:

- make a last effort to*
- a. NASA will ^{make a last effort to} launch and service the industrial facility (three times per year) using the Shuttle system. NASA has already agreed to defer payments for these launches until the facility generates a revenue stream or two years after the initial launches.
 - b. The Federal Government will commit to a minimum \$140 million lease agreement per year for five years.
 - c. The Federal lease agreement will begin on the date that NASA has agreed to launch the facility, regardless of whether the launch occurs contingent upon the facility being otherwise ready for launch on that date.

Proposal 12: The Administration will announce a Federal commitment to a commercially developed, owned, and managed pressurized Shuttle middeck module: Spacehab.

Spacehab modules are pressurized metal cylinders that fit in the Shuttle payload and connect to the crew compartment through the orbiter airlock. These modules take up approximately two tenths of the payload bay and increase the pressurized living and working space of orbiters by approximately 1,000 cubic feet. The area of the Shuttle where Spacehab fits is ideal for microgravity research. In addition, the modules can serve as additional habitation for crew and specialists. The facility is intended to be ready in mid-1991.

The Federal commitment will include the following:

- a. A commitment to manifest the modules on the Shuttle up to three times per year, depending upon customer demand for Spacehab.
- b. A NASA commitment to lease part or all of the Spacehab facility primarily to work off its backlog of secondary R&D payloads.

Proposal 13: NASA will make the ~~Shuttle's~~ ^{Shuttle} expended external tanks available to all feasible private sector endeavors, without recovering the cost of the tanks,

recurring

over the next five years, subject to national security and public safety restrictions. NASA will provide any necessary technical assistance to these endeavors on a direct cost basis.

Proposal 14:

If an emergency return vehicle is required,
NASA will announce performance safety, and schedule requirements for a crew emergency return vehicle (CERV) to be designed, built, and operated by the commercial sector. A criteria for awarding the contract will be that the proposed vehicle: (1) be developed at a cost lower than were the Federal Government to develop it; and (2) have a significant commercial use.

Proposal 15:

The Administration will foster a more competitive environment in satellite telecommunications by encouraging the swift change of two policies that currently place private satellite systems at a disadvantage relative to INTELSAT:

a. Ending the FCC's "balance loading" policy.

The FCC currently requires that approximately half of all international voice traffic carried by AT&T be routed through INTELSAT, the _____, regardless of the lesser cost of alternative routing. This provides a secure market for INTELSAT and a source of monopoly revenue for cross-subsidization of services in markets where INTELSAT has competitors.

b. Lifting restrictions on separate system access to the "public switch network".

"Separate", i.e. nonINTELSAT satellite systems, are prohibited from the INTELSAT-controlled public switch network, whereas cable networks providing identical services are not excluded. Separate satellite systems cannot have access to or provide their own customers with access to INTELSAT's large customer base. This policy protects INTELSAT's telephone, telegraph, and telex markets and disadvantages private communication satellite systems, such as PanAmSat, which has been trying to provide such services.

This proposal would revise an internal 1984 directive authorizing the Secretaries of State and Commerce to develop criteria for authorizing separate satellite communications

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systems. Neither this proposal nor the one above would require legislation or abrogation of U.S. obligations under the INTELSAT treaty.

Proposal 16:

The Congress would charter a Corporation to raise capital funds aimed at financing the infrastructural elements of the Nation's future space activities. These elements comprise essentially those which contribute to several types and/or a large number of missions over periods in excess of 10 years.

The Corporation would raise essentially private capital with government guarantees; it would collect user fees from government, commercial, and foreign users; it would use these fees to amortize capital, pay interest, and reinvest as opportunities arise.

The agencies responsible for the missions would continue to be responsible for research, development, and production/deployment.

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Comments by COB

INDUSTRIAL SPACE FACILITY

The Administration will announce a Federal commitment to the Industrial Space Facility (ISF) developed by the commercial sector. The Federal commitment will include the following:...

Background

The Industrial Space Facility (ISF) is a privately financed, constructed and operated space platform, proposed by Space Industries, Inc. and Westinghouse. The ISF will be launched and serviced by the shuttle and may be used as a: manufacturing facility, assembly platform, test bed, laboratory, power source or storage facility. The ISF module, when docked to the shuttle, provides a shirtsleeve work space to conduct manned research or maintenance activities. It supports automated research and processing payloads when orbiting in a free-flying mode. The ISF could be launched as early as 1991; it is currently manifested on the shuttle for 1992.

The ISF can serve as a: shuttle enhancement by extending the shuttle's on-orbit duration and providing additional power, a shirt-sleeve work space and storage space; space station pathfinder by offering a test facility for systems, user equipment, logistics and operating procedures and by extending shuttle on-orbit duration during space station build-up; defense research and operations facility by accomodating special purpose equipment and providing access to open space, short-term high-power surges and secure controlled integration and operations; material sciences laboratory by supporting either manned or automated experiments and allowing on-orbit reconfiguration and servicing.

The Space Industries Partnership has already raised \$30 million for design and development work. It plans to raise an additional \$200 million in equity investment and \$475 million in debt to deliver one fully functional ISF on orbit. The Space

Industries Partnership has an agreement with NASA to provide 3 shuttle flights on a deferred payment basis.

Analysis

Government-created risks represent barriers to attracting debt financing into commercial space ventures. In the case of ISF, private debt markets are unable to assume the risk of timely shuttle launches, overall shuttle performance and the commercial risk associated with insufficient user contracts. Consequently, necessary debt capital is unavailable unless the government directly or indirectly assumes responsibility for timely shuttle performance and for providing a long-term commitment to purchase services sufficient to secure commercial financing. The Space Industries Partnership will assume responsibility for timely delivery and on-orbit operations of the ISF and will assume cost overrun risks by providing basic on-orbit services at fixed rates.

Pros

- o ISF represents a dramatic privatization initiative, involving \$250 million of private capital at risk to help build the nation's space infrastructure.
- o Scientific and commercial interests have confirmed the critical need for near-term facilities like ISF.
- o The proposed approach (a fixed-price government service contract) is an efficient way to stimulate private investment and innovation in space. It is a fiscally responsible way to help restore space leadership.
- o The U.S. will have a permanent space facility in orbit in 1992-put there with private capital.
- o Successful deployment of ISF will help break the current logjam in commercial space development and encourage other large-scale entrepreneurial space ventures.
- o It is expected that a competitive market will develop after the initial contract period helps establish the commercial

viability of on-orbit services. [Note: the government service contract covers only a portion of the ISF to facilitate debt financing. The remainder must be sold to commercial customers if the Partnership is to make a profit.]

Cons

- o Neither NASA nor DoD has established a requirement for a facility like ISF.
- o A government service contract of this magnitude should be awarded competitively, even though doing so may constitute an expropriation of a privately financed development effort.
- o The funding source and timing have not been identified. ?
- o Neither NASA nor DoD have stated they have a need for such a facility.

INTELSAT Proposal

The government will foster a more competitive environment in satellite telecommunications by changing two policies that currently place private satellite systems at a disadvantage relative to INTELSAT: 1) end the FCC's "balanced loading" policy and 2) lift restrictions on separate system access to the "public switch network."

INTELSAT uses the revenues from its dedicated monopoly markets to sell services in competitive markets at below cost. Reducing the monopoly revenues INTELSAT now enjoys will restrict INTELSAT's ability to engage in this predatory practice. The government can foster a more competitive environment through two specific changes in policy:

- 1) **Balanced loading:** The FCC requires that approximately half of all international voice traffic carried by AT&T be routed through INTELSAT, regardless of the cost of alternative routing. This provides a secure market for INTELSAT and a source of monopoly revenue to cross-subsidize services in markets where INTELSAT has rivals.

PRO: - The balanced loading is an FCC policy that can be altered by the FCC without approval from Congress and is not part of the INTELSAT agreement. The FCC has been asked by the Departments of State and Commerce to consider removal of the balanced loading policy, nevertheless a Presidential endorsement will expedite the process.

CON: - The FCC has already started the process of removing its "balanced loading" policy, and the Administration has expressed its support for that effort. This proposal is therefore unnecessary and irrelevant.

- 2) **Public Switch Network (PSN) Access:** Separate satellite systems are excluded from the PSN controlled by INTELSAT, whereas cable networks providing identical services are not excluded. Separate satellite systems cannot have access to or provide their own customers access to INTELSAT's large customer base. This policy again protects INTELSAT's telephone, telegraph, and telex market and severely disadvantages private communication satellite systems, such as PanAmSat, which are trying to provide these services.
 - o Presidential Determination 85-2 stating that "separate satellite communications systems are required in the national interest" instructed the Secretaries of State and Commerce to develop the criteria for authorizing such systems. Their letter to the FCC embodies the separate

systems policy. The Senate Report on the Foreign Relations Authorization Act for FY 1987 states that the President will review the Determination "from time to time...to ensure an efficient and responsive international telecommunications system." While no Congressional action is needed to alter this policy, a reversal of the position in the letter of November 28, 1984 from the Secretaries of State and Commerce to the FCC would be necessary.

- o These alterations in domestic policy should not entail any abrogation of United States obligations under the INTELSAT treaty.

PRO: - This would remove the United States support for the monopoly position of INTELSAT with respect to the PSN.

- It would not require Congressional action.

CON: - The Secretaries of State and Commerce developed the restrictions on separate system access to the PSN only three years ago.

- We need to convince other nations of the benefits of our competitive approach after INTELSAT has had time to adjust its operations and planning. Regardless of the United States policy, each other sovereign nation makes its own decision on both the degree of facilities competition it will support, and the degree of competitive access to facilities it will allow within its territory.

ADVANCE DRAFT

1-115/87

CAPITAL FUNDING OF SPACE INFRASTRUCTURE DEVELOPMENT

A study will be conducted to explore the means whereby the nation's private capital resources can be enlisted in order to support the space goals that lend substance and credibility to (continuing) United States space leadership.

The study will define space infrastructural elements, comprising essentially those which contribute to several space missions or mission types, including non-recurring development and production costs.

Several capital financing techniques will be considered. The simplest would consist of having private corporations or consortia develop infrastructural components (launchers, platforms etc.) on their own funds, in return of government-guaranteed multi-year market for the successful product(s).

A second, broader approach would call for a Government-chartered quasi-private Corporation, empowered to raise capital in the domestic and international markets. The Corporation would use the capital thus raised to fund the infrastructure R & D, production and deployment, and would collect user fees to pay interest and amortize the principal. While the currently involved Government agencies (NASA and USAF) may use this mode of financing, preference should be given to private U.S. corporations.

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SPACE STATION PRIVATIZATION

Proposal 17:

NASA would revise its Guidelines on commercialization of the Space Station to clarify and strengthen its commitment to private sector investment in the Space Station program. To underscore this commitment, NASA would announce, through a Statement of Interest in the Commerce Business Daily early in 1988, that it is prepared to purchase commercial goods and services to the fullest extent feasible for development, operations, and logistics support of the Space Station, where such goods and services: (1) are not already being contracted for; and (2) are part of the approved program plan. Such goods and services would be privately developed and financed, and would fall into 3 categories:

- services, i.e., support for operations and logistics (includes items such as waste disposal, data and communications management, engineering support services); and
- space transportation for assembly and servicing, which would include options for heavy-lift launch support.
- equipment and components not already contracted for.

NASA's current policy "welcomes and encourages participation" in the Space Station program by the private sector. The policy only states that NASA "will entertain proposals for commercial development and operations." This policy statement is not of sufficient strength that the private sector will make the necessary investments in development of space infrastructure.

Thus, it is important that there be specific and strong guidance to NASA that privatization of some aspects of the Space Station is desirable not only for the encouragement of space commercialization, but also to help maintain a reasonable schedule for development, deployment, and operations in the face of severe fiscal constraints on the Federal budget.

The private sector would finance the development, production and operation of its elements, with the Federal government, through NASA, acting as the customer. Joint government-industry ventures could also be considered. In all cases, the commercial partner would own all rights to the

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resulting technologies, with royalty-free use by the government for its own purposes.

Private sector proposals will be evaluated on the basis of criteria including amount of private sector investments and the degree of risk sharing.

December 11, 1987

(To be inserted into Chapter V)

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Proposal 6. The Congress would charter a Corporation to raise capital funds aimed at financing the infrastructural elements of the Nation's future space activities. These elements comprise essentially those which contribute to several types and/or a large number of missions over periods in excess of 10 years.

The Corporation would raise essentially private capital with government guarantees; it would collect user fees from government, commercial and foreign users; it would use these fees to amortize capital, pay interest and reinvest as opportunities arise.

The agencies responsible for the missions would continue to be responsible for research, development and production/deployment.

another gov't organization
presupposes outcome of space policy director study - Deke